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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST PRODUCTS

FOREST ECONOMICS

RANGE RESEARCH

MAY - 1933



BRANCH OF RESEARCH

May, 1933

	<u>Page</u>
Forest Experiment Stations	
Allegheny -----	1
Appalachian -----	3
Central States -----	4
Intermountain -----	6
Northeastern -----	9
Northern Rocky Mountain -----	10
Pacific Northwest -----	14
Southern -----	17
Research, Region 2 -----	22
Manuscripts -----	24

NOTICE

With this issue, the Monthly Report will be discontinued for the months of June, July, and August. Material for the September issue is due in Washington on October 10.

ALLEGHENY FOREST EXPERIMENT STATION

General

Plans for the E.C.W. cut heavily into the time of most members of the staff, particularly Forbes and Hough. Hough made two trips to the Allegheny National Forest to discuss with Supervisor Bishop our plans for work on the Kane Experimental Forest, and to contribute what we could to the training of silvicultural foremen.

A poorly attended but fairly satisfactory meeting of the Advisory Council was held at "Compton", the new arboretum of the University of Pennsylvania in the outskirts of Philadelphia. Much of the discussion centered on problems arising out of the E.C.W. A committee was appointed to encourage the donation of privately-owned forest land to the States and Federal government, for the immediate purpose of enlarging the area on which conservation corps men can be employed, but for the more important ultimate purpose of getting into public hands lands which cannot be managed for forestry under private ownership. Mr. Madeira of the Council, himself a coal operator, said that he felt a number of owners in the coal regions of Pennsylvania would be glad to surrender the titles to their surface lands, provided they could retain access to their veins. Transfer of title to the public appears to us as the only solution to the hitherto unsolved problem of giving decent fire protection to forest lands in the anthracite coal region. Mr. Richards of the Council is making a survey of the laws in Eastern states permitting the states to take title to tax-delinquent lands and to put them under permanent forest management. Mr. Richards hopes that those states which cannot finance the management of such lands will be enabled to donate them to the Federal government. As a member of the Council of the Pennsylvania Forestry Association he has been chiefly instrumental in the passage this spring of a law which permits the counties of the State to turn over tax-delinquent lands to the Department of Forests and Waters, and which makes it nearly mandatory upon the Department to accept these lands. In view of the difficulty of obtaining competent foresters to supervise stand improvement work by the conservation corps, the Council voted to suggest to the Secretary of Agriculture that he urge the agricultural colleges and other universities to give short courses in silviculture to men already having good training in botany. Because of the importance of all forestation work at this time, the Council authorized the Station to call a conference on nursery methods and planting methods. In few regions has more work been done in these fields by the State authorities, but there has been very little pooling of experience, and adjacent states pursue entirely different policies with respect to species used, methods of planting, and similar details. A tentative invitation to hold the meeting at Mont Alto was issued by Director Ziegler of the Pennsylvania Forest Research Institute.

The Council approved without change the program of work recommended for the next fiscal year by the Station. This had already received tentative approval from the Branch during a brief visit to Washington by Forbes.

Thanks, we believe, in part to Station encouragement, the University of Pennsylvania is emphasizing the development of "Compton" as an arboretum rather than as a general botanical garden. Part of the graduate botanical research will be definitely directed into the field of tree genetics, and forest pathology is already receiving emphasis. Collections of tree seedlings representing about 25 species have been turned over to the University this spring from the Forest Service and state forest schools in the West, and the Station bespeaks the continued cooperation of our sister Stations in enlarging the stock of material from known habitats. It becomes increasingly evident to us that in spite of quarantines America is within the next 500 years going to harbor the plant pests of the entire world, and that in the practical wiping-out of chestnut we have a warning which cannot be disregarded. Small scale arboretum trials of promising tree species of the entire world may enable us to repair further inevitable losses among our native trees.

Management

The data obtained from the Kane Forest inventory has been put in shape for easy visual analysis. The cruise transects have been plotted on the topographic map, and the composition of each individual tenth-acre, in terms of per cent of basal area for each species, has been indicated with colors.

The dying of hemlock in East Tionesta Creek has been attributed to insects. Entomologists, however, believe that the insects are secondary, and the primary cause of death is the severe drought of 1930.

Hough has progressed far enough in the analysis of remeasurements on the Little Arnot plots to justify our belief in the stimulating effects of partial cutting upon the growth of residual beech and maple; the ordinarily dominant cherry and ash have shown little acceleration in growth rate; yellow birch, a poor species in this portion of its range, has not shown much response to better growing conditions.

Forestation

Handicapped by lack of any continuous assistance, Wood made what is probably our last plantings at Camp Ockanickon, replacing with shortleaf pine all of the seedlings which have died in previous plantings. Because of the irregular spacing in these under-plantings, it has been necessary to mark every seedling. These stakes have not been disturbed.

APPALACHIAN FOREST EXPERIMENT STATION

ECW

The Station participated in the instruction of cultural crew foremen for the Emergency Conservation Work on three national forests. On the Pisgah, a ten-day training course was conducted by Nelson, Buell, and Sims, with Ranger Wilson of the Pisgah staff, according to a schedule prepared by Nelson. Two days were devoted to tree identification, and the remainder of the time was spent in actual stand improvement, using charts prepared by the Station. A number of stands were visited, classified according to condition classes, and the recommended improvement cuttings, thinnings, and cleanings made under close supervision. The 25 cultural crew foremen for the Pisgah National Forest camps were quartered at the Bent Creek Field Laboratory.

Barrett assisted in similar work on the Cherokee, and C. A. Abell on the Monongahela National Forest.

Streamflow and Erosion

The heavy foliage appearing during the first three weeks of May has shown a marked effect in reducing the amount of precipitation that reaches the forest floor during light rains. Twelve interception troughs are now in operation under an old-growth oak-pine stand in order to determine the actual amount of interception.

Forest Management in North Georgia

Two examinations of the yellow poplar reproduction quadrats at the Georgia Mountain Experiment Station were made. The examination of May 6 showed that germination was just commencing, no correlation between seed bed condition and germination being yet apparent. By the end of May, however, definite indications were noted. A brief summary of the data for the examination is as follows, the areas and seed sowed for each condition being equal:

<u>Seed bed condition</u>	<u>Per cent of total germination</u>
Seed raked into leaf litter	69
Leaf litter removed and seed sowed on scarified soil	22
Seed sowed directly on leaf litter (check)	7
Burned	2
	<hr/> 100%

Biological Survey

Mr. A. H. Howell, Senior Biologist from the Washington Office, and Burleigh, have been making a biological reconnaissance of Georgia. Specimens are being collected and detailed notes kept of the distribution and abundance of the birds and mammals of the State.

Management - Coastal Plain

The Franklin, Va., selective logging permanent sample plots were re-examined. Complete reexamination was made of all trees over 2.5 inches d.b.h., and of 20 reproduction quadrats. The March, 1933, fire caused little immediate mortality in the larger trees which were left at the time of the selective logging in 1929, but killed practically all reproduction on the plots, both seedlings and sprouts.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

During the first week in May, Baker, Day, and Anderson spent several days on the Morgan-Monroe State Forest in Indiana, arranging for the selection of an experimental area for the use of the Station, under cooperative agreement with the State Division of Forestry.

On May 15-20 Baker and Kuenzel made a week's trip through southern Indiana and Illinois, to investigate further the possibilities of extending the Station's work in this region. They visited Old Timbers, the 1,600 acre estate of Mr. Alexander Thomson, President of the Champion Coated Paper Company, and President of the Central States Research Council, where about 500 acres of old fields have already been planted with forest trees. This property is typical of a large area requiring reforestation in southern Indiana and Illinois. Mr. Thomson has offered the Station his full cooperation in reforestation studies. The Clark County State Forest in southern Indiana was also visited, and several days were spent with Extension Forester Sawyer in becoming better acquainted with the forest conditions of southern Illinois.

Emergency Conservation Work

During the month, much of Kellogg's time was required by the task of being liaison officer for the 5th corps area. Because of the delays in authorization of State camps, as well as delays in the perfection of fiscal regulations governing the State Foresters, the various State projects have not progressed as rapidly as desired.

Locust Borer Investigation

May has been devoted chiefly to cooperative work with Dr. Auten on a site study of black locust plantations in which plots were established during the past two seasons. The field party of six men was split up into two crews of three men each; Auten, Sears, and Hall made up one party, and Allison, Cummings, and Wygant comprised the other. During the first two weeks of May both crews worked in Indiana and Ohio, but during the last two weeks, Auten, Sears, and Hall made a study of the plots which are located in Pennsylvania and New York.

During the early part of the month a number of downy woodpeckers were observed to be feeding on young locust borer larvae in southern Ohio. A subsequent observation made three days later disclosed that 85 per cent of the young larvae on this area had been destroyed. The work of the predator has been observed in other parts of Ohio and in Pennsylvania and New York. At Professor Houser's suggestion, a number of trees have been caged to prevent this bird from feeding on the larvae in an attempt to determine its effectiveness in reducing locust borer populations. Further work will be done on this phase of the problem during June.

Black Locust Plantation Site Study

As has been reported under the locust borer project, Auten and his field crew made a site study of black locust in cooperation with Dr. Hall of the Bureau of Entomology. The loessial regions of western Kentucky and Tennessee; the old, glacial soils of southern Indiana, Illinois, and Ohio; the unglaciated regions of those states; the Allegheny Plateau and intermountain region of Pennsylvania; and the coastal plain and Hudson Valley region of New York were visited.

Extreme variation in site was observed. The best sites were in the loessial regions of Kentucky and Tennessee and on the terrace of the Hudson River near Newburgh, New York. The poorest sites were found on the old, glacial soils along the Ohio River where extreme development of tight subsoil has occurred. Poor sites also were found on dry gravel moraines. A total of about 150 locust sites were visited and studied. A large mass of data was acquired and it is hoped that an analysis will bring out some facts concerning the suitability of locust to different soil conditions. With the exception of a few plots in southern Michigan, which will be visited early in June, the field work on this project is now completed.

Forest Plantation Study

Remasurements of the plantations of white, red, and Scotch pine were taken at the Boy Scout Camp in Delaware County, Ohio, by Kellogg, Kuenzle, and Diller during May, to determine the 1931 and 1932 growth. The effect of the 1930 drought was very apparent. During the drought year, very good height growth was made by the seedlings. One year later, in 1931, very retarded growth was made (only 0.1 foot in many instances), particularly in the white and red pine plantations.

Farm Woodland Management

Livestock Management Phase. DonUyl reports that the third season's tests of the livestock carrying capacity of the farmwoods at the Pinney-Purdue Farm was initiated on May 10, when the yearling steers were placed in the fenced pasture areas. While vegetative growth was nearly normal on adjacent areas, the heavy overgrazing on the experimental plots was undoubtedly a factor in the very sparse growth on May 1, the usual date for the starting of the grazing period.

Growth and Yield Phase. Day and Anderson, with some assistance from Kuenzel, utilized practically the entire month in the establishment of permanent and semi-permanent plots in the better ungrazed oak-hickory farmwoods in central Ohio. Certain portions of this phase, particularly the establishment and recording of the plot data, are very similar to the work contemplated on Kuenzel's project (M-3), so that it appears desirable to work out the details of field technique together.

One of the first studies which must be made in connection with these projects is an adequate check on existing volume tables. Practically all the recent volume tables for hardwoods have been constructed in connection with the Oak Yield study and were made up of trees selected from even-aged stands. Since the farm woodland management study involves all aged stands, it will be necessary to ascertain the adequacy of these even-aged tables when applied to all aged stands. Measurements from nearly forty black oaks and a few white and red oaks from 15 to 30 inches D.B.H. have been secured during the month and further measurements will be taken at every opportunity.

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Range management

Bunchgrass, Granitic Soils, Idaho. Plans have been completed for continuing several phases of vegetative studies which have been under way for several years in connection with a range and erosion problem on the Boise River watershed. The extent to which the program can be fulfilled largely depends on getting additional assistance from ECW research men but regardless of this help, much should be accomplished during the season.

Pearse plans on remapping and reestimating from 80 to 100 quadrats and major plots located at strategic points over the range and to analyze the results in relation to similar data obtained in 1930. This analysis should indicate whether significant changes in the vegetative cover and the eroded condition of the soil have taken place in a period of three years as a result of protection from grazing and rodents. It is fully expected that significant changes will not have materialized in so short a time on some of the badly depleted areas and these will be remeasured in subsequent years.

Pearse has distributed twenty rain gauges to various cooperative weather observers on the watershed and has tentatively located several additional snow courses. In future years the climatic data derived from these sources should prove useful in interpreting annual fluctuations in forage growth, grazing capacity of the range and streamflow from the watershed.

Liter E. Spence, collaborator from the University of Idaho, will continue his studies of the root systems of range plants this season in an effort to determine the relative merits of each for binding the surface soil against erosion. He plans to extend his investigations by studying the same species as last year, but on different aspects and a range of site qualities.

He also plans to include a number of shrubs in the list of plants to be excavated.

Climate and Plant Growth, Great Basin. Studies show more and more the importance of weather as a factor in the seasonal development and growth of range forage plants. Rather striking differences in development and growth during the same growing season are apparent for the same species in different vegetative zones on summer ranges.

In the study of seasonal development of range forage plants at the Great Basin Branch, three main vegetative growth periods were recognized and are as follows for the grasses: (1) spring (foliage growth), (2) summer period (seed stalk growth), and (3) late summer and early fall period (seed and plant maturity); for the weeds, (1) the main foliage growth, (2) flowering period, and (3) seed and plant maturity; and for shrubby plants, (1) the leafage production period, (2) flowering and twig growth period, and (3) the fruit ripening period.

The more important climatic factors that influence the main vegetative growth periods are temperature and precipitation. The influence of temperature is of greater importance than precipitation during the spring growth period. Consistently low temperatures retard the melting of the accumulated winter snows and delays vegetative growth which results in a late spring. The early vegetative development (spring period) is also influenced by the amount of soil moisture which has accumulated from the melting snows. Prolonged storms during the early growth period combined with low temperatures delay vegetative development.

Precipitation during the second main vegetative period is the important climatic factor to be considered. An excess of precipitation delays development while on the other hand a deficiency greatly hastens development.

In the third or seed and plant maturity period, both precipitation and temperature are important. As in the second period, an excess or deficiency of precipitation will delay or hasten seed or plant maturity. Low temperatures that follow a prolonged storm period invariably injure the immature seed and consequently results in a poor seed crop.

These studies are valuable to range management because a better knowledge of the fluctuations in seasonal development of range forage plants are obtained. Furthermore, it is necessary to make both seasonal and annual grazing plans more flexible in order to take care of these various fluctuations in seasonal development. Eventually it will give a more stable range and livestock industry.

Erosion and Streamflow

Granitic Soils, Idaho. Active field work on one of two phases of the erosion problem to be studied this year on the Boise River watershed got under way on June 1 when Field Assistants Danibls and Coleman reported at Boise. These men, under the supervision of Pearse, will measure surficial run-off and erosion, as induced by various intensities of artificial rainfall, on

from 75 to 100 five mil-acre temporary plots scattered over the watershed. The study is aimed at determining the rate and amount of run-off and erosion which results on the characteristic granite soils of the region from given intensities of rainfall under different types and densities of vegetation and different degrees of trampling by livestock. A specially developed unit of portable apparatus will be used to assist in gathering this information.

The second phase of this year's work on the Boise erosion problem - the selection of sites and installation of permanent run-off plots and natural watersheds - should get under way before July 1, with assistance in construction work from one of the ECW camps. It is planned, tentatively, to locate the permanent installations in the vicinity of the Boise Basin Experimental Forest branch headquarters, the buildings for which are now being constructed near Idaho City. Some difficulty has been experienced in discovering suitable sites for the permanent installations owing to the scarcity of extensive bunchgrass range areas, but it is hoped such an area can be found reasonably close to Idaho City. It is planned to establish three pairs of 1/10-acre run-off plots as a means of determining the influence of heavy, moderate and no grazing on run-off and erosion. It is planned, also, to establish three natural watershed areas of from 50 to 75 acres each for testing the same influence on streamflow.

Great Basin Erosion. Erosion Control, ECW. In connection with the ECW program, erosion control work is planned for nine camps on national forests in the state of Utah. Erosion control work at several state camps is also contemplated, but the state program has not as yet been definitely approved.

Spring Run-off. Run-off from melting snow from Erosion Areas A-B at the Great Basin Branch Station, began on May 19 this year, approximately one week later than the date at which run-off started in any preceding year on record.

Desert Experimental Range

A cadre of 5 Army officers and 21 men arrived at the Desert Experimental Range the week of May 22. All the recruits in the group were fine clean young fellows between the ages of 19 and 25 and hail from Virginia. Camp was established about 40 miles west of Milford, Utah, at Wah Wah Spring and consists of about 15 large brown army tents which presents an imposing sight in the heart of the desert range country. In addition to the men from Virginia, 25 experienced men from Tooele County, Utah have been assigned to the camp. Within a few days the number of men at camp will probably exceed 100 men. John C. Wade, 1st Lieut., W.J. Cahill, 1st Sgt., J.J. Yeager, Supply Sgt., J.B. Watson, Mess Sgt., and Anthony Alexanvage, Cook, Pvt. 1st class, are in charge of camp and are handling the recreation activities. Work has been started which consists mainly of fence construction, post cutting, building construction and road construction. It is contemplated that by fall the entire boundary fence will be completed around the desert experimental range and that headquarters buildings will be finished.

Emergency Conservation Work

Despite the fact that ECW work is not supposed to interfere with research, Pickford has spent most of his nights, Sunday, Saturday afternoons, and, of course, legal working hours in the office handling the mass of details necessary to get the I.F.R.E.S. Camp F-15 going and to keep it humming.

To date, materials have been purchased for seven buildings; one deep well outfitted with pump, casing, 40,000 gallon reservoir, and nearly half a mile of pipe for culinary and stock watering purposes; 90 miles of fence, both woven and barbed wire; together with trucks, tools, miscellaneous equipment necessary to make the newly created 55,000 acre Desert Range Reserve located in Pine Valley, western Millard County, Utah, bloom like a rose.

Pickford insists that writing specifications for articles he knows nothing about, to be built in a site that is not yet designated by men that are not yet forthcoming, is the highest form of research.

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NORTHEASTERN FOREST EXPERIMENT STATION

On May 19 a Civilian Conservation Corps camp was established on the Gale River Experimental Forest. The first job for the men at this camp was the planting of 40,000 trees on an old burn which was covered with poplar and brush of varying degrees of density, with scattered natural seeding of balsam. Red pine, white pine, white spruce, and Norway spruce four-year transplants were used in various combinations. Since the job was started so late in the season, the stock was rather far advanced and in order to protect the trees not receiving any shade from the natural growth, a crew was put to work cutting balsam branches to provide shade for each tree set in the open.

Late in the summer when the plantation has had an opportunity to become established, it is planned to release the plantation by cutting or poisoning the popple and other weed species. The boys on this job appear willing and interested but the hours prove short and the output low.

The large scale methods-of-cutting experiment in spruce and hardwoods on the Property of Finch, Pruyn and Company near Newcomb, New York, was visited by a group of students from the Yale School of Forestry in the course of a silvicultural field trip. Although it will be several years before material results of this experiment accrue, the area is of considerable interest already and has attracted widespread attention.

Stickel and Westveld inspected the area burned in the spring of 1932 near Tahawas, New York, on land of Finch, Pruyn and Company. This area presents an unusual opportunity for study of fire damage because the Company has a record of permanently marked line plots at ten chain intervals, tallied before the recent cutting, after cutting but before the fire, and again

immediately following the fire. The Company has also mapped the burn according to three degrees of intensity. Stickel will use this area as the basis for some of his work this summer.

An experimental planting totalling about thirty acres was established by Stewart and Morey on an area near Norwich, New York, made available for our use by the New York State Conservation Commission. The object of this experiment is to determine the effect of depth of planting on survival, growth, and subsequent root development. Seedlings and transplants of four species were planted by three methods and with four depths of planting.

In a preliminary study to serve as a guide to work done by the Civilian Conservation Corps, Doctor Spaulding concludes that rot is more likely to spread from one sprout to another in the same clump in white oak than in red oak, and that it is therefore usually desirable to cut all or none of the stems in a group of white oak sprouts.

Before leaving for an extended trip to the West, Miller examined a number of areas which may be suitable for his proposed longtime experiments on the inter-relation of forest management and wild life.

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NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

It has been rather difficult to plan the work to be done by the Station using enrolled men of the E.C.W. under technical supervision, due to the rapidly changing orders authorizing the establishment of the E.C.W. camps in this Region. The definite approval of a number of camps has now made it possible to go ahead with the plans for a part of the work contemplated. Mr. Weidman has been very busy locating the areas upon which thinning work will be done. The Station has been given four of the six technical supervisory positions allotted Region 1. Kenneth Davis has already been assigned to the Station and the three other men have been selected and will report early in the second week of June.

Forest Survey

Four mappers under G. M. DeJarnette started field work during the month of May in North Idaho. Due to the late seasonal conditions, the work during the first two weeks of May was confined to the open ponderosa pine type in Kootenai County. The men have now moved down into Benewah, Shoshone and Clearwater Counties. The remainder of the men that can be employed on the funds allotted (three more field mappers) will report for duty June 7.

Logging and Milling

One of the principal objectives of the A.C.M. selective logging study is to determine the increase in conversion value that can be expected from economic selection of trees and logs as compared to clean cutting.

Plot 1 of this study was clean cut according to the usual company practice in which ponderosa pine is cut to a minimum diameter limit of 14" d.b.h. However, before logging took place a marking board made a hypothetical marking in which only those trees and logs were selected that would be designated under a strictly economic selective cutting.

Plot 3 of the study was cut according to the usual Forest Service practice. Similarly, before logging took place, a hypothetical marking was made which was a compromise between a purely economic selection and Forest Service selection.

The following table shows the results obtained on these two plots:

COMPARISON OF PLOTS							
Ponderosa pine							
	: Net	: Logs	: Net	: Per	: Lbr. selling value		
	: volume	: per	: over-	: cent	: Lbr. tally	: Log scale	
	: cut	: M	: run %	: defect	:	:	
	:	:	:	:	:	:	
	:	:	Plot 1 - 4.05 acres	:	:	:	
Clean cut	: 54,870	: 6.0	: 23.3	: 12.2	: \$20.89	: \$25.74	
Selected	: 34,130	: 3.7	: 18.3	: 11.4	: 23.06	: 27.20	
	:	:	Increase in lumber value		<u>2.17</u>	:	
	:	:	:	:	:	:	
	:	:	Plot 3 - 6.87 acres	:	:	:	
Forest Service	:	:	:	:	:	:	
Sel. cut	: 67,020	: 6.8	: 20.5	: 8.2	: 21.95	: 26.44	
Modified F.S.	:	:	:	:	:	:	
Sel. Cut	: 47,080	: 4.9	: 15.0	: 6.5	: 24.10	: 27.70	
	:	:	Increase in lumber value		<u>2.15</u>	:	
	:	:	:	:	:	:	

As indicated above, the economic selection increased the value of the lumber produced by \$2.17 per M and decreased the volume of sawlogs removed by 38%, compared to a similar increase on plot 3 of \$2.15 per M accompanied by a volume decrease of the sawlogs removed of 30%. Computation of production costs for the study have not been completed, so the net return per acre for the various methods of cutting has not yet been figured.

The increase in value of the lumber produced from plot 3, as well as the reduction of the volume logged, was secured largely by elimination of defective and low quality, coarse, limby trees, which could be disposed of by girdling. A strict minimum diameter limit was not used in this selection, but where it was desirable to remove trees under 21" d.b.h. for silvical reasons they were disposed of either by cutting or designated for girdling.

Lumber Census

In May returns were obtained from about 100 Idaho and Montana delinquents. At the end of the month the final consignment of schedules was mailed to Washington and the canvass reported closed.

The 1932 production figures for the two states as compiled by this Station are as follows:

LUMBER CUT - M FT. B.M.
(Mills Cutting Less Than 50 M During Year Excluded)

<u>Species</u>	<u>Idaho</u>	<u>Montana</u>	<u>Combined Cut</u> <u>Volume</u>	<u>%</u>
Idaho white pine	169,425	2,705	172,130	47.8
Ponderosa pine	45,354	54,439	99,793	27.8
Western larch	10,813	32,620	43,433	12.1
Douglas fir	15,376	16,253	31,629	8.8
Spruce	2,104	4,492	6,596	1.8
White fir	3,734	30	3,764	1.1
Lodgepole pine	779	479	1,258	0.4
All other	823	30	853	0.2
Totals	<u>248,408</u>	<u>111,048</u>	<u>359,456</u>	<u>100.0</u>

In addition to the above combined total, Idaho and Montana mills cutting less than 50 M produced 2,811 M feet. Including these small mills, total production in the two states amounted to 362,267 M, of which 250,080 M was produced in Idaho and 112,187 M in Montana.

In comparison with the 1931 output by mills producing 50 M feet and upward, the 1932 cut figures show a decrease of 50.3 per cent for Idaho and 29.7 per cent for Montana. The aggregate drop based on the combined cut of both states was 45.4 per cent.

Measuring Fire Danger

Forty-three inflammability stations in R-1 and R-4 were supplied with newly calibrated wood cylinders and/or duff hygrometers early in May. Four more stations are being equipped early in June.

The month of May was exceptionally favorable, from a fire control standpoint, all stations from which reports were received generally showing Class I danger (no men needed for fire control), with only a few isolated days of Class II danger. The last three days of the month, however, have been very hot and dry throughout the Region and the situation is expected to change rapidly.

The instrumental method of measuring fire danger should demonstrate its advantages especially well this season. On account of the overload of E.C.W., which will prevent many rangers from keeping their usual close touch with prevailing fire danger, their alternates or assistants will be depended upon for reports of danger. Naturally these men, many of them new to their particular jobs, could not be expected to estimate danger exactly the same as their rangers would. Serious errors could well be expected if total dependence should be placed upon such estimates. But the wood cylinders and duff hygrometers will be in place, and their readings will be readily comparable with similar measurements for past years, regardless of who reads them.

Furthermore, the use of the Fire Danger Meter will assist, if not insure, the similar consideration of the six principal factors of fire danger so that there should be no more variation between reports by these new men than there would be if all the rangers themselves were on the job as usual.

Daily measurements of all fire danger factors in full sun, half sun, and under full shade were commenced at the Priest River Branch on May 1. Dr. E. A. Evans, formerly with the General Electric Company, on lightning protection research, is handling the routine fire-weather work at Priest River this season. Evans has already contributed considerable valuable information concerning the protection of Forest Service buildings and phone lines from lightning damage. Some detailed studies of lightning storm behavior and effects are planned for later in the season.

Late in May, Jemison returned to his fire-weather work at the Station, after a nine months' detail to the Washington Office. After a few days in Missoula familiarizing himself with work done and plans made during his absence Jemison left for Priest River, inspecting several fire weather stations enroute.

Range

Mr. E. J. Woolfolk reported for work on May 3. He will assist Kennedy on investigative studies connected with the project under way at Miles City. Most of his time will be devoted to charting quadrats in the summer and winter pasture layouts.

The experimental cattle were moved from the winter pastures to the summer pastures on May 12. The per cent of weight lost by the cattle from December 1, the date on which the cattle entered the pastures, and May 12, was about the same for the different degrees of grazing. The cattle in the heavily used pastures lost 10.3% of their entering weight, while those in the medium and lightly used pastures lost 10.1% of their entering weight.

The calf crop from the different lots is exceptionally good. The cows in the medium used pastures have calved 100%, those in the lightly used pastures have calved 90%, and those in the heavily used pastures have calved 90%. The average birth weight of the calves from former two lots of cattle exceeds that of the latter lots by four pounds.

A one room house has been constructed at the well in the summer pastures. At present it is serving as headquarters for the temporary field assistant.

Silviculture

Early spring field work on the seedling survival project at Priest River was started May 1 by Field Assistant Ellison. Three installations on clear cut, half cut, and full timber sites include fall sowings of numerous small quadrats to six species on duff, mineral, and burnt mineral surfaces. There are watered and unwatered set-ups. Observations are made of soil and air temperature, soil moisture, evaporation, precipitation, wind movement

and relative humidity. Germination started at the beginning of May and mortality was taking place by the middle of the month, chiefly from damping off. Due to the late, cloudy spring weather, death through drought and high ground-surface temperatures, which cause the largest losses later on, had not yet started. Ellison is handling the early work till Haig returns from educational furlough on June 15.

The arboretum planting comprised putting in about twenty-seven species in blocks of one-tenth to three-quarters of an acre, mostly the larger size. Spacing is 6x6 feet and the object of the large size of blocks is to secure a sample of forest stand conditions for each species. The following species were planted this spring: ponderosa, Jeffrey, Norway, Austrian, Scotch, jack, lodgepole, Swiss Mountain, Macedonian, Sugar, limber, and western white pines; Engelmann, Norway, red, white and Colorado blue spruces; eastern red cedar, noble fir, Coast and Colorado Douglas firs; Chinese elm, American elm, caragana, Russian olive, green ash, and box elder.

In addition to the arboretum work, about 35,000 trees were planted on several large blank areas in the experimental forest. One of these was the 16-acre tract of defective hemlock which was cleared and slash burned last fall. On this alternate planting of white pine and spruce, white pine and cedar, pure western white pine, pure Macedonian white pine (reputedly blister rust resistant) and pure ponderosa pine are being tried. Another planting activity was the setting out of wild stock of cedar and hemlock in transplant rows in the small station nursery. About 2000 plants of the former and 1000 of the latter species were planted. The purpose is to secure stock for arboretum and experimental planting of these species which are not now being raised in the Regional nursery. Excellent natural seed beds were found on slash burned spots, where small 3 or 4 year old seedlings stood in dense stands and could be gathered easily and quickly. From 8 to 12 men, with Field Assistant Fosdal as foreman, were used on the various planting jobs.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

Munger has been appointed official delegate of the United States to attend the Fifth Pacific Science Congress at Vancouver, B.C., June 12-14. He will give a paper on "Practical Application of Silviculture to Overmature Stands Now Existing on the Pacific", and will also read the Forester's paper "Recent Applications of Science to Forestry" and McArdle's paper "The Ecological Aspects of Douglas Fir Regeneration."

Three experienced foresters, W. E. Griffie, L. H. De Groote, and C. V. Zaayer, working under the direction of Kline of the Forest Survey staff, have started making a detailed topographic map and timber estimate of the Wind River Experimental Forest, Columbia National Forest. When this forest is done the crew will move to the Deschutes National Forest and do the same

work for the Pringle Falls Experimental Forest. This is an ECW project as authorized for experimental forests. Intensive topographic control and mapping will be done, using a scale of 8 inches to the mile and a contour interval of 25 feet. The area will be well monumented and a detailed cruise and type and site maps will be made.

Section of Silviculture

Experimental Forests - An Experimental firebreak of red alder was planted at Wind River. This planting, over a mile long, goes along the western boundary of the Trout Creek unit through the old Yacolt burn. A plantation of black cottonwood also was established. Preliminary surveys were made for roads to be constructed by the ECW camp at Wind River. Plans also were drawn up for the work to be done on the Pringle Falls Experimental Forest by the ECW camp located near the forest.

Fire Studies - "Hazard sticks" were sent to each forest in Region 6 early in the month, and one set of sticks for intensive study was placed at Wind River. Work on the visibility studies was begun with the employment of George M. Byram, who worked on the project last year, and E. J. Workman, another physicist. Dr. Workman is to be head of the physics department at the University of New Mexico. One of the first jobs in this study was an investigation of glasses to determine the best type for use by lookouts to reduce sun glare. As expected from last season's work, ordinary smoked glasses are one of the best types and are far superior to amber glasses. Another type has been found, however, which, if combined with the smoked type would give vastly superior results. The spectral transmission values for each color of filter was obtained as a guide in selecting the best color for the glasses. Tests with smoke under natural conditions also were made. The results of this phase of the visibility study emphasize the importance of using lenses made of optical glass and carefully ground (the ordinary "sun glasses" are made of pressed glass). Examination of hundreds of the ordinary pressed type of lens shows that practically every pair of glasses examined had major optical flaws. That is, the left lens might be for a near-sighted person and the right lens for a far-sighted person. Or, one lens might show a decided twist of the axis toward the left while the other lens would tend to twist the eye in the opposite direction. Thus, such glasses instead of improving eyesight actually tend to distort vision, and because they pull the eye to unnatural positions, their use usually results in more or less eye strain or fatigue or headache.

Section of Products

General - Hallauer of the Washington Office spent two weeks at the Station. In connection with the requirements phase of the Survey, urban construction sampling was discussed with him with the idea of picking up loose ends that might be completed during the next few months. The tentative working plan for rural construction sampling was discussed here and with Professor Scudder at Oregon State College. Five days were spent on a trip into southern and eastern Oregon during which Hallauer and Lodewick had an opportunity to see and discuss buildings on different types of farms and to try out portions of the questionnaire that had been proposed. On the whole,

the discussions led to a better understanding of conditions in the Pacific Northwest, and will undoubtedly lead to very complete cooperation on the part of Oregon State College.

Requests for information and advice have been received from individuals, companies and from the Regional Office. The latter has been interested in the possibilities of metal connectors in tower construction and the use of plywood for signs. Advice has been asked regarding the prevention of teredo damage to logs in storage, the possibilities of using ponderosa pine mill waste in the manufacture of kraft paper, and the construction of fore and aft pole roads for motor trucks. A piece of hemlock was shipped to the Swedish Forest Experiment Station. Increased interest is being shown in stave wood, as judged by the inquiries regarding suitable stands of Oregon white oak. One piece of wood has been submitted for identification.

Lumber, Lath and Shingle Census - During the month 288 completed schedules were forwarded to Washington, making a total of 1,663 sent in to date. Johnson spent eight days in the field in Washington checking delinquent companies and securing additional information in some cases. There are still a number of companies unheard from even after four requests. It is expected to complete the 1932 census by June 15.

Mill Scale Study - Some time has been spent on the Douglas fir mill scale studies in checking the recovery value computations, in tracing the curves and charts, and in writing a preliminary draft of the introductory portions of the report.

Forest Insurance

The month of May was devoted to work on the California and Idaho climates, collection and summarization of loss data in those two states, summarization of extensive revision material for Idaho, and combination of climatic data for Idaho and California with similar data for Oregon and Washington. Some time has also been devoted to map work, making final indication of the location and limits of the region, incorporating material collected on the trip.

Forest Survey

The tag ends of field work in the Douglas fir region were very nearly finished in May, and June 15 or 20 ought to see all field work done, including the picking up of changes due to fire and cutting for those counties originally worked in 1930 and 1931. Three of the Survey's regular staff and five temporary field men were on field work in May.

The remainder of the regular staff, together with five office temporaries, continued on the job of basic type and volume computations, which at this time is approximately 60 per cent done.

Andrews finished a tentative working plan for the inventory phase for the east side of Washington and Oregon, and Kemp has started gathering preliminary data so as to be able to start field work with some temporary help in late June or early July. It is planned that a 2-inch-to-the-mile scale will be used in mapping on the east side and that blue-print copies of the General Land Office township plats will be used for base data, and copies of such plats have been made for three eastern counties.

The Survey staff has been going over Johnson's cutting depletion figures to check up on possible discrepancies. One of the best checks on any inconsistency in cutting depletion data, especially when such data are broken down into species and county groups, is to compare such data with the records of what is on the ground in the various counties, and with volume data now available the Survey staff can best check such depletion statistics.

As has been stated before, getting an accurate ownership picture in the Douglas fir region without spending an inordinate amount of money on some form of abstracting procedure has been and still is a real problem. However, the data on ownership gathered by the New Public Domain study for eighteen Douglas fir region counties have been of very material help to the Survey, since the New Public Domain study was able to dig into ownership matters in a manner beyond that considered feasible for the Forest Survey.

So many changes, due to cutting, fire, and shifts in major ownership groups, have occurred in the counties in the Columbia River Oregon Release Unit since these counties were first computed, that a material job of re compiling has been necessary. This has given the Survey staff a slant on the job of keeping the Survey inventory data current. For example, last fall fires changed types on 88,000 acres in one county alone, which involved many days of recomputing. If there were no fires or cutting, ownership changes alone would create a material problem in keeping data current.

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SOUTHERN FOREST EXPERIMENT STATION

Naval Stores

In the study of longleaf pine defoliation by fire and its effect on gum yield, the defoliation estimates made on April 14, five weeks after burning, were much too low. Defoliation continued for at least another month and new estimates were made during the last week in May.

Field work on the controlled burning test in the Olustee Experimental Forest has been completed with the exception that sampling reproduction could not be established on four plots because of the very heavy hog damage. Out of 354 seedlings measured, 87 (about 25 per cent) of all tallied on 332 mil-acre plots have been rooted up this spring. As soon as the tract is fenced, the four plots referred to will be laid out.

Management

The recently established plots at Urania have furnished abundant data for the construction of local pulpwood and cubic-foot volume tables for second-growth loblolly pine. It has also been possible to establish conversion factors and ratios between such items as diameter breast high, number of bolts of pulpwood, volume in cords and in cubic feet, time required to fell and buck up, etc. A table showing the correlation between these various items is of great value in helping to determine the size of tree most profitable to cut for pulpwood, and in furnishing specific reasons and arguments for leaving small trees for further growth.

Many interesting relationships have been developed, among the more valuable of which may be noted the following:

1. There is a striking increase in the number of bolts per tree with an increase of 1 inch in diameter breast high in the smaller diameter-breast-high classes, especially between 4 inches and 6 inches.

2. The cutting of small trees into pulpwood results in a tremendous waste of stemwood that rapidly becomes of merchantable size with relatively small increase in the diameter breast high of the tree.

3. It takes nearly four times as many 4-inch trees as 5-inch trees to make one cord; and between 5 inches and 7 inches the number of trees per cord drops fast enough to show the inadvisability of cutting small trees for pulpwood. Small increases in diameter breast high of small trees result in relatively large increases in the amount of cordwood per tree.

4. The percentage increase in cubic volume with an increase in diameter breast high is very large in the small trees and becomes gradually smaller in the larger diameters. Once again the waste and inadvisability of cutting small trees are shown.

5. The output in cords per hour for two men is at a maximum for 7-inch trees, but, except for the 4-inch trees, does not vary widely. The relation shown was not anticipated, as it was thought that the output would increase regularly up to at least 12 inches diameter breast high.

6. The output in peeled cubic feet increases consistently with increases in diameter breast high.

7. It is generally recognized that the actual cubic contents of solid wood in cords made up of small bolts is not as great as in cords made up of large bolts, but just how great this difference may be is probably not often known. There is a pronounced increase in volume of peeled wood in a cord with an increase in diameter breast high of the trees from which the pulpwood is cut.

Financial Aspects of Private Forestry

Spillers and Read completed the field work of the land-use study in the Lower Piedmont Region of Georgia. Six areas, each with a distinct soil type and each with an area of about 12 square miles, were cruised on a line plot survey. It was generally found that loblolly and shortleaf pine readily appropriate areas abandoned from farm crops and grow rapidly in reasonably well stocked stands. It was also found that in all six units, large areas had been abandoned from agriculture due to erosion. Forests were found quite effective in checking erosion.

Red Gum Growth and Yield

In general, second-growth red gum stands on the alluvial bottomlands of the South have been found to be surprisingly free from insect and fungous enemies. In the lower Pearl River bottoms, however, stands seem to be suffering from an entomological or a pathological agency, or a combination of the two. Ridge-like swellings resembling those common over healed wounds are found on the lower stem of merchantable red gum trees. These ridges are more or less closely spaced on the stem, and reduce appreciably the commercial value of the timber. Buried at a variable depth beneath each ridge-like swelling is a pocket of discolored wood. Boards sawed from logs thus affected warp and check badly in the drying process.

Upon examination of trees showing fresh exudations of gum, minute round holes were found, extending through the bark as much as 3/4-inch into the wood, usually to a zone of incipient wood discoloration. The inference is that these holes are the primary damage. After close examination, no indications of larvae or insect activity were found in or near these holes. Hence it is impossible at present to account with certainty for the presence of these holes. Further work is being done to determine the cause and extent of the loss of commercial timber. Nearby virgin red gum trees seem to be entirely free from this form of damage.

New Public Domain

Field work on the New Public Domain project in Arkansas was completed this month. Five counties have been studied intensively since inauguration of field work in April, 1932. These five counties are as follows:

- Drew County (used as check and as area to test out field technique)
- Little River County (shortleaf-loblolly-hardwood type)
- Washington County (oak-hickory type)
- Johnson County (shortleaf-hardwood type)
- Lee County (Delta bottomland hardwood type).

The gross area of these counties (2,319,360 acres) constitutes 7 per cent of the gross area of the State (33,616,000 acres). Their forest area (1,409,580 acres) constitutes 6.4 per cent of the forest area of the State (22,000,000 acres).

Final figures on the area of reverted and delinquent land in these counties have not been worked out, due to the necessity of several revisions of the areas shown on the books of each county. The approximate areas are as follows:

Delinquent and Reverted Area, in Acres						
Counties	Drew	Little River	Washington	Johnson	Lee	Total
Reverted	:	:	:	:	:	:
to State	42	19,568	17,674	29,382	29,736	96,402
Delinquent	:	:	:	:	:	:
for 1930	:	:	:	:	:	:
taxes ^{2/}	2,578	41,183	86,162	24,026	65,765	219,714
Delinquent	:	:	:	:	:	:
for 1931	:	:	:	:	:	:
taxes ^{3/}	4/	57,204	(?) 42,000	40,411	52,837	192,452
	:	:	:	:	:	:
Total	2,620	117,955	(?) 145,836	93,819	148,338	508,568

^{1/} As of date of county survey (1932-33).

^{2/} Area unredeemed as of date of survey.

^{3/} Area unredeemed as of date of survey.

^{4/} Non-delinquent at time of survey.

Forest Survey

Hardwoods. During May the office computations for the Delta hardwood unit of Mississippi were carried forward. In the 4,425,000 acres in the Delta, it was found that 1,736,900 acres, or 39.3 per cent, is forest land. Of this acreage less than 100,000 acres, or about 5.3 per cent, is classed as virgin timber; the remainder has been culled or cut over, or is second growth. The total stand of virgin timber is estimated to be about 800,000,000 board feet gross scale. The total amount of timber was found to be 5,088,500,000 board feet gross scale. Of this total volume, more than 80 per cent was found in stands having 2,500 board feet or more per acre; 690,690 acres of forest land supported stands estimated to contain 2,500 board feet or more. Estimates are being prepared so that the total stand may be shown by condition classes, by forest types, and by species groups.

In the four broad forest types recognized, the board-foot volumes in each are as follows:

<u>Type</u>	<u>Volume in M feet, Board Measure</u>
Cypress-hardwood	703,160
Cottonwood-willow	376,140
Overcup oak-pecan	824,720
Mixed hardwoods	3,184,480
Total	5,088,500

The distribution of the volume by species and species groups shows overcup oak to have 798,920 thousand feet board measure, red gum, 588,530 thousand feet board measure, cottonwood and willow 545,910 thousand feet board measure, cypress, 443,030 thousand feet board measure, water oaks (several species), 637,700 thousand feet board measure.

By forest conditions, the volumes are as follows, in terms of thousand feet board measure:

Virgin	800,000
Virgin culled	660,900
Second growth	2,092,900
Cut over	1,534,700

Stand and stock tables have also been prepared.

Pine. The field work in the Central Mississippi Unit, the third one to be surveyed, was fully under way by May 6. The first 10 to 15 miles of lines 13, 14, and 15 were through the rough, broken, loessal bluffs where the crews encountered some of the roughest topography and the best upland hardwood timber as yet found in Mississippi. In spite of the steepness of the slopes, there is little or no erosion taking place in the "bluff" portion of the silt loam upland. In the more level area east of the bluffs, erosion is a very serious problem, and the survey findings agree with those found in the erosion study during 1930.

Erosion is of little or no importance in the bluffs owing to the fact that they are generally heavily wooded.

An exploratory cropmeter study, carried on by Lentz and Lehrbas ahead of the line plot crews and covering 504 miles, indicated that 72 per cent of the total area in the central Mississippi unit is nonforest and 28 per cent is forest land. Of the forest land, more than 50 per cent is second growth under saw-timber size and 28 per cent is second growth saw-timber size partly cut. Less than .3 of 1 per cent is uncut old growth. These, of course, are tentative figures taken for reconnaissance purposes.

Dr. Eino Saari, Professor of Forest Economics at the University of Helsinki, Finland, during his week's visit to the Station, had an opportunity to discuss forestry problems with members of the Station staff. In conference with members of the Survey staff, Dr. Saari discussed certain phases of the Finnish National Forest Survey which are not mentioned in the published reports. He stated that the Finnish survey had made no attempt to predict future growth. Current annual growth alone was determined. A separate and independent study of forest depletion was made after the survey was completed but not as a part of the survey itself. These economic studies on depletion have been made by Dr. Saari and are independent of the inventory and growth studies carried on by Dr. Ilvessalo. No attempt has been made to keep the survey data up to date or to keep it current. The Finnish survey reports have been used by the various forest industries and have formed the basis for a national forest policy.

RESEARCH ACTIVITY IN REGION 2

Field work for the 1933 season was begun at the Fremont Station at the beginning of the month. Efforts during the month were not concentrated on any one project; rather routine observations were made in several experiments.

Type Study (T-1):

The regular series of meteorological observations for the growing season, including, among others, those of soil surface temperatures and soil moisture, was again initiated on May 1. The staff was confronted with the unusual situation of having the ground on the north slopes covered with snow - at one time to a depth of twenty-seven inches - during the first half of the month. All of the precipitation came in the form of snow; the average temperature for the month being appreciably subnormal. During the non-vegetative period, beginning October 1, 1932 and extending through this May, a total precipitation of 12.82 inches (practically all snow) was recorded. Sixty-nine per cent of this fell between April 4 and May 15. The result has been a very late spring. On May 22-23, a severe and unseasonal wind-storm, which assumed gale-like proportions, wrecked several units of meteorological equipment at Fremont, besides uprooting and breaking off trees throughout the experimental forest.

Management of the Experimental Forest (M-1):

Four cut-over plots (.918 acre each) in the ponderosa pine type within the Experimental Forest were removed early in the month as was also one check plot in an unthinned stand of Douglas fir and Engelmann spruce saplings. No opportunity has been had to work up the data.

Seed Production Studies:

Douglas fir trees blossomed very late this season. The cold spring, which followed a very mild winter, set in sufficiently soon to prevent the early emergence of the flowers and as a result, very few flowers succumbed to frosts and cold weather, a condition that prevailed to a very pronounced extent in 1931 and 1932, when heavy crops were produced. At the upper end of the species' range, the flowers did not make their appearance until almost the beginning of the growing season on June 1. The flower crop, in general, is small in the Pikes Peak region; the most surprising phenomenon being the relative absence of staminate flowers. The crop is confined to less than 50 per cent of the trees under observation.

The seed produced by the nine experimental Douglas fir trees on the Holy Cross Forest in 1932 was sown and the tests were still running at the end of the month. Also, the seed collected in the local Engelmann spruce and ponderosa pine seed production studies last year was sown for testing during the month.

Seed Source Studies

The several plantations of last spring (1932), which include four within the Fremont Experimental Forest and one at the Monument Nursery, were examined to determine the survival and relative resistance of the various lots to the severe drouth conditions that have existed since their establishment. These plantations include progeny from seed produced both by natural and artificial pollination in the Fremont supposedly mistletoe resistant strain and also progeny from the trees growing at different elevations to study comparative development in relation to the elevational habitat.

Winter losses were not heavy, survival in the Fremont plantations at the present time ranging between 70 and 77 per cent of the original number of trees planted, a good showing in view of the very severe conditions for growth to which these trees were exposed during their first season in the field. In the Monument plantation, which lies at an elevation approximately 2,000 feet below that of Fremont, the losses have been much heavier, amounting to 49 per cent during the 1932 growing season and 7 per cent during the succeeding winter. The progeny from trees growing at the higher elevations demonstrated themselves consistently superior in point of ability to survive than the trees representing the parents growing at the lower elevations.

Sample trees were selected at random from among the thirty lots of 2-1 stock representing individual parents in the Nebraska plantations source of seed study at the time the stock was field planted in the Bessey plantations this spring and shipped to Fremont. Here they were studied to determine the effect of heredity upon development as expressed by dry weight, stem thickness and size of top. The results have not yet been compiled.

Thinning in Sapling Douglas Fir Stands (Mt-161):

At the time the Jarre Canyon plots on the Pike Forest, which were established and thinned in 1922, were remeasured last fall, it was necessary to forego the reproduction counts because of the presence of too much snow upon the ground. The postponed counts were made late in May. Some snow still lay upon the ground and the following tabulated results were based upon the counts made on snow-free ground. The data are on the basis of one acre.

Number of	:	:	:	:
Plot	:	1	4	3
Character of	:	:	:	:
treatment	:	Unthinned	thinned	thinned
Trees in stand	:	:	:	:
in 1932	:	1918	1416	951
New seedlings	:	:	:	:
present in	:	:	:	:
1927 (1)	:	0	54	218
New seedlings	:	:	:	:
present in	:	:	:	:
1932 (1)	:	56	2559	926

(1) By new seedlings is meant seedlings coming in since the time of thinning.

During the first five years after thinning, very little reproduction established itself. In 1927, the moderately and heavily thinned plots, which had the same number of seedlings, exceeded the lightly thinned plot in the number of new seedlings. At this time none were found under the unthinned stand. In 1932 the lightly thinned stand had forged far ahead of the moderately thinned stand and slightly ahead of the heavily thinned stand. Most of the seedlings now present started in 1930 and 1931. The results obtained so far indicate that reproduction may be expected to follow even a light opening of the stand, whereas little if any establishes itself under the condition of heavy stocking that exists in an unthinned stand. However, it will be more significant to determine the effect of the degree of opening upon subsequent survival.

Emergency Conservation Work:

In connection with the work of the Civilian Conservation Corps, practically all effort is still being concentrated upon the establishment of camps. The Experiment Station staff has not yet taken an active part in the program, but it is expected that it will be called upon to give advice and to assist in other ways in developing the contemplated program of thinning and erosion control operations throughout the region, once the work gets under way.

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